

NEW MOSS RECORDS FROM MEXICO

CLAUDIO DELGADILLO M. and DALE H. VITT

Department of Botany, Duke University, Durham, North Carolina 27706

Department of Botany, University of Alberta, Edmonton 7,
Alberta, Canada

The bryoflora of Mexico has been studied for many years by several workers (Hampe, 1869; Bescherele, 1872; Müller, 1874) but the bryogeographical relationships have been examined critically only in the last twenty five years. Sharp (1939) observed a number of mosses distributed both in Mexico and eastern United States and discussed them in a subsequent series of papers (1944, 1945, 1946). Sharp and Iwatsuki (1965) have listed those species common to Japan and Mexico, and Crum (1956) has pointed out the existence of a bicentric (Afro-American) pattern of distribution of genera known from Mexico, sometimes with a third center of distribution in southeastern Asia.

In the summer of 1968 the senior author visited several high mountains of Mexico as a part of a study on the relationships of the alpine bryoflora of the country. One of these mountains was Cerro Potosí, the northernmost peak having an alpine vegetation, which is situated at 24°53'30" N. Lat. and 100°10'30" W. Long. near Galeana and the village of 18 de Marzo, Nuevo León. Among the species identified, we have recognized the following as not previously reported from Mexico:

Encalypta vulgaris Hedw. According to Nyholm (1954), the species is common in Fennoscandia. It is also found in Europe, the Canary Islands, Madeira, northern Africa, Asia, New Guinea, and New Zealand. In North America it occurs throughout the Rocky Mountains and westward (Flowers, 1938). Bartram (1949) noted it from the mountains of New Mexico and Arizona, and in Guatemala. This leaves a gap in the distribution of the species which is partially filled by the collections from Cerro Potosí.

Four collections were made on the mountain summit, *Delgadillo 2376* MEXU, TENN, and *2378a* MEXU, TENN, in the *Pinus culminicola* scrub near the alpine meadow. These were on boulders in open and moist places and were subalpine. Nos. *2345a* MEXU, TENN, and *2448a* MEXU, were from the alpine area, on soil and soil-covered rocks, in open and moist places. The rocks of the area are calcareous.

Grimmia anodon B.S.G. This species has been reported from Fennoscandia, northern, western, and central Europe, the Pyrenees, northern Italy, Algeria, Morocco, the Caucasus, western and central Asia and eastern India. From North America it has been reported from Greenland and New Brunswick (although, according to Howard Crum (personal communication), there are no specimens from New Brunswick at CAN, DUKE, or NY); also from British Columbia, Yukon southeast to South

Dakota and Saskatchewan and south to Arizona. All Mexican collections came from the summit of Cerro Potosí where they grew on exposed boulders in alpine and subalpine communities. *Sharp 3912*, collected in 1945 from the same mountain, is this taxon, although originally identified as another species of *Grimmia*.

The Mexican plants agree with the characteristics of the species except that the upper part of the leaf margin is bistratose. Jones (1933) indicated that in *G. anodon* the leaves are mostly bistratose.

Specimens examined: *Sharp 3912* TENN, *Delgadillo 2361* MEXU, TENN, *2412* MEXU, TENN, *2429* MEXU, TENN, also *2359a*, and *2445a* MEXU.

Orthotrichum anomalum Hedw. Crum (1951) indicated in his discussion on the Appalachian-Ozarkian-Mexican flora relationships: "It is probable that many other North American species, already reported from other parts of Latin America, will be discovered in Mexico." Among other species, he pointed out *Encalypta vulgaris* (reported here), and *O. anomalum*. Although Crum identified a Mexican specimen of the latter species (*Sharp 3005* MICH, TENN), he made no report on it.

Orthotrichum anomalum is circumpolar in distribution: throughout northern and central Asia and Europe, south to northern Africa. In North America it occurs on calcareous rocks from Nova Scotia, Alaska, south to Arizona and New Mexico; Iowa and Virginia; Mexico and Haiti. Bartram (1949) reported it from Guatemala; however, upon examining the specimen cited by him, we have concluded that the material is not *O. anomalum*. Sharp's specimen was collected from crevices of calcareous rocks on Cerro Potosí at about 9500 feet.

Orthotrichum cupulatum Hoffm. ex Brid. The species occurs throughout Europe, south to northern Africa and in central Asia. In North America it is restricted to the drier parts of the Rocky Mountains with outlying populations in the Black Hills, South Dakota, southwestern Wyoming, and central Texas. Infrequent in Washington, Oregon, and California. All the Mexican specimens have been collected on exposed boulders in alpine or subalpine communities on Cerro Potosí.

Morphologically *O. cupulatum*, in its typical form, has immersed, ovate capsules which are 16-ribbed. The exostome is finely striate (as opposed to papillose in *O. strangulatum*) and the endostome is rudimentary or lacking. The Mexican material compares well with typical *O. cupulatum*, except that the exostome teeth are coarsely papillose-striate and 8 short endostome segments are present.

Specimens examined: *Sharp 3911* TENN, *Delgadillo 2412* MEXU, MICH, TENN, *2403* MEXU, MICH, TENN, *2431* MEXU.

Orthotrichum pallens Bruch. This species is distributed with a sporadic pattern in boreal and montane regions over much of the Northern Hemisphere. In the Old World it has been recorded from Finland, Sweden, Norway, Austria, Germany, Switzerland, France, Italy, and Russia. In North America, *O. pallens* var. *parvum* was reported by

Venturi from Yellowstone National Park. However, material collected and named as such by Flowers from Utah does not compare well with Venturi's description and should be excluded from the species concept of *O. pallens*. A discussion of the taxonomy of this species is given by Miller and Vitt (1970).

Orthotrichum pallens is distributed discontinuously in North America throughout the western Cordillera; the Black Hills, South Dakota; eastward through Manitoba, Ontario, northern Michigan, the Gaspé Peninsula, Quebec, and Newfoundland. It is reported here from Cerro Potosí which appears to be the southernmost station in North America. The species was found as an alpine or subalpine epiphyte living on *Ribes* sp. and *Pinus culminicola*, often mixed with *O. pycnophyllum*.

Specimens examined: *Delgadillo 2364* MEXU, MICH, TENN, *2439a* MEXU, TENN, *2365b* MEXU, *2440* MEXU, and *2375b* TENN.

From the discussion it can be seen that the species reported here show northern affinities. For some species, Cerro Potosí seems to be situated at the end of the geographical range while for others, it represents a "stepping stone" for a wider distribution toward Central America.

All of these species have their closest stations to the west and north. Beaman and Andresen (1966) noted that 25% of the vascular plants of the summit of Cerro Potosí have an affinity with the flora of the southern Rocky Mountains. The affinities of this flora (as shown also by these moss records) are thus, with western North America, not with the flora of the southeastern United States as is the case for many mosses of eastern Mexico (Pursell and Reese, 1970). These species of mosses were probably associated with the Arcto-Tertiary flora and their present distribution is doubtless related to the history of glaciation and climatic changes during the Pleistocene. Apparently, the Sierra Madre Oriental, of which Cerro Potosí is a part, was uplifted in the Pliocene (Beaman and Andresen, 1966).

Noteworthy is the distribution of these species, all of which reach Mexico through the mountains of southwestern United States from western North America. If they have a wider distribution in Mexico along the Sierra Madre Occidental, no evidence yet has been provided. However, in view of the distribution of many other mosses, at least the *Encalypta* may be expected to have a wider distribution in Mexico, although only *E. ciliata* has been reported from the central part of the country.

We are indebted to A. J. Sharp for advice and criticism of the manuscript and to H. A. Crum for his comments on distribution. Research was supported in part by a grant from the National Science Foundation GB-8212 to N. G. Hairston, University of Michigan, for research in Systematics and Evolutionary Biology. The field work was made possible thanks to a Grant-in-Aid of Research from the Society of the Sigma Xi, the coöperation of the University of Tennessee Botanical Laboratory and the Biological Institute of the National University of Mexico.

Greatly appreciated is the help of Francisco González M. from the Instituto de Biología, U.N.A.M., while we were on Cerro Potosí. This paper is a contribution from the University of Tennessee Botanical Laboratory, N. Ser. 349 and the Department of Botany, University of Michigan.

LITERATURE CITED

- BARTRAM, E. B. 1949. Mosses of Guatemala. *Fieldiana, Bot.* 25:1-442.
- BEAMAN, J. H., and J. W. ANDRESEN. 1966. The vegetation, floristics and phytogeography of the summit of Cerro Potosí, Mexico. *Amer. Midl. Naturalist* 75:1-33.
- BESCHERELLE, E. 1872. *Prodromus bryologiae Mexicanae ou énumération des mousses du Mexique avec description des especes nouvelles.* *Mém. Soc. Sci. Nat. Cherbourg* 16:144-256.
- CRUM, H. A. 1951. The Appalachian-Ozarkian element in the moss flora of Mexico with a check-list of all known Mexican mosses. Unpublished Ph.D. dissertation, University of Michigan, Ann Arbor.
- . 1956. Notes on *Hypnodon*, a genus of Orthotrichaceae new to North America. *Bryologist* 59:26-34.
- FLOWERS, S. 1938. Encalyptaceae. *In* A. J. Grout, *Moss Flora of North America North of Mexico* 1:137-145.
- HAMPE, E. 1869. *Species muscorum novae Mexicanae.* *Verh. K. K. Zool.-Bot. Ges. Wien* 19:507-510.
- JONES, G. N. 1933. Grimmiaceae. *In* A. J. Grout, *Moss Flora of North America North of Mexico* 2:1-60.
- MILLER, N. G., and D. H. VITT. 1970. Additional bryophytes from sinkholes in Alpena County, Michigan, including *Orthotrichum pallens* new to eastern North America. *Michigan Bot.* 9:87-94.
- MÜLLER, C. 1874. *Novitates bryothecae Müllerianae.* 3. Musci Mexicani. *Linnaea* 38:620-660.
- NYHOLM, E. 1954-1960. *Illustrated Moss flora of Fennoscandia.* II. Musci. Fasc. 1-4.
- PURSELL, R. A., and W. D. REESE. 1970. Phytogeographic affinities of the Gulf coastal plain of the United States and Mexico. *J. Hattori Bot. Lab.* 33:115-152.
- SHARP, A. J. 1939. Taxonomic and ecological studies of eastern Tennessee bryophytes. *Amer. Midland Nat.* 21:i-vii, 268-354.
- . 1944. Some problems in American Bryology. *Lilloa* 10:265-283.
- . 1945. Notas sobre la flora de la región escarpada de la parte noroeste del estado de Puebla. *Bol. Biol. Univ. Puebla* 11-12:29-32.
- . 1946. Informe preliminar sobre algunos estudios fitogeográficos efectuados en México y Guatemala. *Revista Soc. Mex. Hist. Nat.* 7:35-44.
- , and Z. IWATSUKI. 1965. A preliminary statement concerning mosses common to Japan and Mexico. *Ann. Missouri Bot. Gard.* 52:452-456.

NOTES AND NEWS

TWO SPECIES OF *Panicum* (POACEAE) NEW TO OREGON.—*Panicum villosissimum* Nash is native to the eastern one half of the United States and has not previously been reported from the West. A specimen of *Panicum* collected on July 29, 1931, by E. C. Johnston (*s. n.*) at Troutdale, Oregon (CAS), long left undetermined, was identified some years later as *P. pacificum* Hitchc. & Chase. This is the western species this specimen most closely resembles. The collection was made late in the growing season, after the spikelets had fallen from the terminal panicles, where the largest spikelets on the plants of this and allied species occur. Those spikelets on the branch panicles produced later in the season are about 2.1 mm long, at least 0.3 mm longer than the spikelets found on the branch panicles of *P. pacificum*. The